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10/635,318	08/06/2003	David Cope	EMI 02.02	8133
27667	7590	02/23/2006	EXAMINER	
HAYES, SOLOWAY P.C. 3450 E. SUNRISE DRIVE, SUITE 140 TUCSON, AZ 85718			PRESTON, ERIK D	
			ART UNIT	PAPER NUMBER
			2834	

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

5/6

## Office Action Summary

Application No.

10/635,318

Applicant(s)

COPE ET AL.

Examiner

Erik D. Preston

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) 27,28,32-43 and 47-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26,29-31,44-46 and 54 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/10/03; 11/12/04
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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**DETAILED ACTION**

***Election/Restrictions***

Applicant's election with traverse of Group I in the reply filed on 1/3/2006 is acknowledged. The traversal is on the ground(s) that Groups I-IV are not independent inventions. This is not found persuasive because, as was stated in the previous office action, the Groups are related as subcombinations usable together, and the search for Group I, a multiple degree of freedom motor connected to an output shaft, classified in 345/161, is not required for Groups II-IV, the search for Group II, a lamination stack for use in a stator, classified in 340/870.32, is not required for Groups I,III & IV, the search for Group III, a coil winding having a plurality of turns therein, classified in 336/115, is not required for Groups I,II & IV, and the search for Group IV, a rotor comprising a linkage member having a spherical surface, classified in 310/46, is not required for Groups I-III.

The requirement is still deemed proper and is therefore made FINAL.

Claims 27,28,32-43 & 47-53 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected Groups II-IV, there being no allowable generic or linking claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-12,15-26,29-31,44-46 & 54 are rejected under 35 U.S.C. 102(e) as being anticipated by Corcoran (US 2002/0053849 supplied by applicant).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

With respect to claims 1,17,24,29,30,44-46 & 54, Corcoran teaches a multiple degree-of-freedom motor comprising: An output shaft (Fig. 21, #702); a stator (Fig. 21, #714) comprising first and second laminated stacks, each of said stacks having an interior curved surface and a coil (Paragraph 106) wound thereon; said stacks being disposed adjacent said output shaft; and a rotor (Fig. 21, #704) fixed to said output shaft and movably supported adjacent said stator with an air gap disposed between said rotor and said stator, said rotor including at least one magnet (Paragraph 107) disposed thereon and being movable along said first said interior curved surface of said stacks in directions defining at least first and second degrees of freedom; wherein energization of the coil of said first stack establishes a first magnetic field to urge said output shaft to rotate both clockwise and counter-clockwise in a first plane, and wherein energization of the coil of said second stack establishes a second magnetic field to urge said output

shaft to rotate both clockwise and counter-clockwise in a second plane substantially orthogonal to the first plane (as seen, for example in Fig. 22).

With respect to claims 2 & 18, Corcoran teaches the motor of claims 1 & 17, wherein said first degree of freedom is substantially perpendicular to a longitudinal axis of wires of one of said coils associated with the first degree of freedom, and said second degree of freedom is substantially perpendicular to a longitudinal axis of wires of the other of said coils (as seen in Figs. 21 & 22).

With respect to claim 3, Corcoran teaches the motor of claim 1, wherein said interior curved surface substantially defines a portion of a sphere (as seen in Fig. 21).

With respect to claim 4, Corcoran teaches the motor of claim 1, wherein said curved interior surface is uniformly curved (as seen in Fig. 21).

With respect to claim 5, Corcoran teaches the motor of claim 1, wherein said interior curved surface has a plurality of slots formed therein (as seen in Fig. 21).

With respect to claim 6, Corcoran teaches the motor of claim 5, wherein said slots lie on planes substantially parallel to one another.

With respect to claim 7, Corcoran teaches the motor of claim 1, wherein said lamination stack comprises a plurality of laminations radially disposed about a center point, wherein a plane of each lamination extends through said center point (as seen in Figs. 21 & 22).

With respect to claim 8, Corcoran teaches the motor of claim 1, wherein at least one lamination stack has an interior curved surface (the tooth tips) with no slots formed therein.

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With respect to claims 9 & 19, Corcoran teaches the motor of claims 1 & 17 wherein at least one said magnet is a permanent magnet.

With respect to claims 10,20 & 25, Corcoran teaches the motor of claims 1,17 & 24, wherein at least one said magnet is faceted (such as is described in Paragraph 82).

With respect to claims 11 & 21, Corcoran teaches the motor of claims 1 & 17, wherein the output shaft is also an input shaft.

With respect to claims 12 & 22, Corcoran teaches the motor of claims 1 & 17, further comprising at least one sensor (of the type as taught in Fig. 7, #64) for detecting movement of said input shaft.

With respect to 15,16,23,26 & 31, Corcoran teaches the motor of claims 1,17,24 & 29 wherein, said stator further comprises a third lamination stack having an interior curved surface and a coil wound thereon; wherein said rotor includes at least one magnet disposed thereon and being movable along said interior curved surface of said third lamination stack in a direction defining a third degree of freedom; wherein energization of the coil of said third lamination stack establishes a third magnetic field to urge said output shaft to rotate in a third plane substantially orthogonal to each of said first and second planes (as seen in Fig2. 21 & 22).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9,11-14,17-19,21,22,24,29,30,44,46 & 54 are rejected under 35 U.S.C. 103(a) as being anticipated by Hanke et al. (EP 0938035 supplied by applicant).

With respect to claims 1,17,24,29,30,44-46 & 54, Hanke teaches a multiple degree-of-freedom motor comprising: An output shaft (Fig. 1, #33); a stator (Fig. 1, #10) comprising first and second stacks, each of said stacks having an interior curved surface and a coil (Fig. 1, #13) wound thereon, said stacks being disposed adjacent said output shaft; and a rotor (Fig. 1, #23) fixed to said output shaft and movably supported adjacent said stator with an air gap disposed between said rotor and said stator, said rotor including at least one magnet (Fig. 1, #22) disposed thereon and being movable along said first said interior curved surface of said stacks in directions defining at least first and second degrees of freedom; wherein energization of the coil of said first stack establishes a first magnetic field to urge said output shaft to rotate both clockwise and counter-clockwise in a first plane, and wherein energization of the coil of said second stack establishes a second magnetic field to urge said output shaft to rotate both clockwise and counter-clockwise in a second plane substantially orthogonal to the first plane (as seen in Fig. 5), but it does not specifically teach the stacks being laminated. However, axially laminated stator cores were very well known at the time of the invention. It would have been obvious to one of ordinary skill in the art at the time of the invention to make the stacks of Hanke from axial laminations since laminated stacks reduce the existence of eddy currents in a stator, and to axially laminate the lamination stacks of Hanke since it is the most common way in the art of positioning stator laminations.

With respect to claims 2 & 18, Hanke teaches the motor of claims 1 & 17, wherein said first degree of freedom is substantially perpendicular to a longitudinal axis of wires of one of said coils associated with the first degree of freedom, and said second degree of freedom is substantially perpendicular to a longitudinal axis of wires of the other of said coils (as seen in Fig. 4).

With respect to claim 3, Hanke teaches the motor of claim 1, wherein said interior curved surface substantially defines a portion of a sphere (as seen in Fig. 1).

With respect to claim 4, Hanke teaches the motor of claim 1, wherein said curved interior surface is uniformly curved (as seen in Fig. 1).

With respect to claim 5, Hanke teaches the motor of claim 1, wherein said interior curved surface has a plurality of slots formed therein (as seen in Fig. 10).

With respect to claim 6, Hanke teaches the motor of claim 5, wherein said slots lie on planes substantially parallel to one another.

With respect to claim 7, Hanke teaches the motor of claim 1, wherein said lamination stack comprises a plurality of laminations radially disposed about a center point wherein a plane of each lamination extends through said center point (the axial laminations of the stator core lie on a plane that is perpendicular with the central axis of the motor).

With respect to claim 8, Hanke teaches the motor of claim 1, wherein at least one lamination stack has an interior curved surface (the tooth tips) with no slots formed therein.



With respect to claims 9 & 19, Hanke teaches the motor of claims 1 & 17 wherein at least one said magnet is a permanent magnet.

With respect to claims 11 & 21, Hanke teaches the motor of claims 1 & 17, wherein the output shaft is also an input shaft.

With respect to claims 12 & 22, Hanke teaches the motor of claims 1 & 17, further comprising at least one sensor (Fig. 7, #40) for detecting movement of said input shaft.

With respect to claim 13, Hanke teaches the motor of claim 1, but it does not specifically teach a cooling fan. However, cooling fans for motors were well known at the time of the invention. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a cooling fan in the invention of Hanke since it would provide a means for cooling the stator of the motor.

With respect to claim 14, Hanke teaches the motor of claim 1, further comprising a communication interface for providing input and/or output signals to detect and/or control the position of said output shaft (as seen in Fig. 7).

Claims 10, 20 & 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanke et al. (EP 0938035 supplied by applicant) further in view of Deeg et al. (DE 19501439 supplied by applicant). Hanke teaches the motor of claims 1, 17 & 24, but it does not specifically teach that at least one said magnet is faceted. However, Deeg teaches a faceted magnet. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the magnets of Hanke in view of the faceted magnets of Deeg as merely a substitution of equally well-known rotor magnets, and also

because it has been held that a change in shape is not considered to be patentably distinct if it does not effect the utility of a device (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)).

Claims 15,16,23,26 & 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Hanke et al. (EP 0938035 supplied by applicant) further in view of Rosenberg et al. (US 6437771). Hanke teaches the motor of claims 1,17,24 & 29, but it does not teach that said stator further comprises a third lamination stack having an interior curved surface and a coil wound thereon; wherein said rotor includes at least one magnet disposed thereon and being movable along said interior curved surface of said third lamination stack in a direction defining a third degree of freedom; wherein energization of the coil of said third lamination stack establishes a third magnetic field to urge said output shaft to rotate in a third plane substantially orthogonal to each of said first and second planes. However, Rosenberg teaches a force feedback system wherein force can be applied to an output shaft (Fig. 2, #44) in three substantially orthogonal degrees of freedom (Fig. 2, #51-53). It would have been obvious to one of ordinary skill in the art at the time of the invention to include another of the lamination stacks of Hanke in the system as taught by Hanke in view of the three degrees of freedom as taught by Rosenberg because it provides a means for simulating the tool impacting a body (Rosenberg, Col. 12, Lines 9-19), and it also would have been obvious to one of ordinary skill in the art at the time of the invention to include another of the lamination stacks of Hanke in the system as taught by Hanke since it has been held that the mere

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duplication of parts has no patentable significance unless a new and unexpected result is produced (In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960)).

**Conclusion**

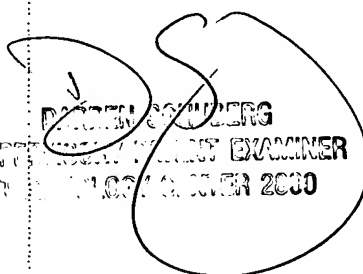
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 4719381

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik D. Preston whose telephone number is (571)272-8393. The examiner can normally be reached on Monday through Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571)272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
02/13/2006

  
ERIK D. PRESTON  
PATENT EXAMINER  
FEB 13 2006